Appendices

APPENDIX-I

Quantitative Analysis of Textbooks and Laboratory Manuals

Most teachers become involved at some time in the choice of textbooks and laboratory manuals or workbooks for their courses. The teacher of a discovery-oriented course must learn to recognize the textbooks or parts of textbooks that lend themselves well to this kind of use.

Simple reading of a textbook is not sufficient to bring out the good and bad points in any kind of quantitative way that will help the teacher make a clear choice of the book that best suits his purpose. One of the worst traps a teacher will face in choosing a suitable textbook is the physical layout and design of the book. Book publishers recognize the sales appeal of books that are physically attractive. Consequently, it is easy to be seduced by the external form of a book. Some of the worst textbooks have worn the prettiest coats.

Following is a sample sheet for quantitatively rating textbooks or single chapters of textbooks on the basis of their content. It shows how all the data for a given book can be combined so that a quantitative rating can be obtained for any book analyzed.

RATING THE TEXT

1. Randomly select and mark ten or more text pages from various parts of the book.

2. Read a block of twenty-five sentences on each of the marked pages and assign each sentence to one of the categories listed below. (If the page contains fewer than twenty-five sentences of normal text, continue to the next page.) Do not include headings, figure captions, summary questions, or chapter introductions in your sample. Begin with the first new paragraph on the page. Your sample may thus span parts of more than one section.

a. Statements of fact. A statement of fact is defined for our purpose as a simple statement presenting a piece of data or an observation made by someone other than the student. *Examples:* (1) Red Lake is 200 feet deep; (2) The moon goes through all its phases in twenty eight days, (3) A cat eats mice; (4) When hydrochloric acid is placed on calcite, a reaction takes place in which carbon dioxide is formed; (5) Bees have stingers.

b. Stated conclusions or generalizations. A conclusion is defined for our purposes as the author's stated opinion about the meaning of or the relationships between items in a series of facts. Examples: (1) From their physical characteristics we conclude that whales are mammals; (2) Convection currents in the earth's mantle probably account for the subsidence and uplift of large parts of the earth's crust.

c. Definitions.

d. Questions asked but answered immediately by the text.

e. Questions requiring the student to analyze data.

f. Statements requiring the student to formulate his own conclusion.

g. Directions telling the student to perform and analyze some activity; statements posing problems to be solved by the student.

h. Questions that are asked to arouse student interest but are not answered immediately by the text.

i. Sentences directing the reader to look at a figure procedural instructions in activities; sentences not fitting any of the above categories.

j. Rhetorical questions.

3. Calculate the index of student involvement for the text:

$$\frac{e + f + g + h}{a + b + c + d}$$

Items a,b,c, and d, do not require student involvement or use of scientific skills. A large number of items included in these categories tends to make a book authoritarian and noninvestigative. On the other hand, a large number of items falling into categories e,f,g and h is characteristic of a book suitable for use in a discovery-oriented course. If you have difficulty deciding whether to put an item in category a,b,c, or d, make a quick judgment. The important distinction to be made is to separate accurately sentences that would fall into categories a,b,c, and d, from sentences that would fall into categories e,f,g and h. Categories i and j have no real bearing on the usefulness of the book in a science course and can thus be eliminated from consideration.

RATING THE FIGURES AND DIAGRAMS IN THE TEXT.

1. Randomly select ten figures or diagrams in the book.
2. Analyze each figure or diagram and assign it to one or more of the following categories.

a. Used strictly for illustrative purposes.

b. Requires students to perform some activity or to use data.

c. Illustrates how to set up the apparatus for an activity.

d. Fits none of the categories above.

3. Calculate the index of student involvement for the figures and diagrams:

$$\frac{b}{a}$$

RATING THE QUESTIONS AT THE ENDS OF TEXT SECTIONS AND CHAPTERS

1. Randomly select ten questions at the ends of ten different chapters.

2. Assign each question to one of the following categories:

   a. Answer can be obtained directly from the text.

   b. Definition.

   c. Question requires student to apply learnings from the chapter to new situations.

   d. Question requires student to solve a problem.

3. Calculate the index of student involvement for the questions:

$$\frac{c + d}{a + b}$$

RATING THE CHAPTER SUMMARIES

1. Select the chapter summaries from three different chapters.

2. Read two paragraphs of each of the three chapter summaries and assign each sentences one of the following categories:

   a. Repeats the conclusions of the chapter.

   b. Raises new questions, the answers to which are not available in the text or are subjects of current research in science.

3. Calculate the index of involvement for the summaries:

$$\frac{b}{a}$$

Determining an Activities Index for the Book

Select at least ten pages at random and glance through each, assigning an index as follows: Count the number of proposed activities required of the students. To get an index number, divide the number of activities found by the number of pages examined.

Subjective Evaluation

At the bottom of the rating sheet, write your subjective opinion of how well the book seems to suit your own behavioral goals for a course. Include a comment on reading level, difficulty of mathematics in the text, and other factors with a bearing on the classroom situation.

Interpretation of the Data

Each index is calculated in a manner so that 0 represents virtually no student involvement; 1.0 represents material with an equal number of

statements requiring no student participation and statements requiring some student thought. Progressively higher index numbers represent progressively higher ratios of investigative to non-investigative material. Infinity would represent a book in which every statement and every figure would require analysis of some kind.

Every teacher must decide for himself just how much he wants his students to do. In general, chapters or books with indices much below about 0.4 will be primarily authoritarian and will contain few challenges to the student other than memorization of facts and definitions.

Conversely books with very high indices, (much in excess of about 1.5) contain virtually nothing but questions. As such, they may not give the student enough data to work with effectively. Other reference sources or the opportunity to experiment extensively must be available to provide data upon which the student can base his generalizations and conclusions.

A very good teacher can use almost any textbook to good advantage. A highly discovery-oriented course can be run using the most traditional of textbooks if the teacher spends most of his class time on experiments and activities and uses the text as something to examine critically rather than as an authority upon which students base their conclusions.

Regardless of what approaches you elect to use, you should critically examine the textbook. Know how other parts of your course must be modified to take advantage of the useful features and to counteract the undesirable features of the textbook.

Text analysis

Number of page analyzed												Total
	a. facts											
	b. conclusions											
	c. definitions											
I.	d. questions asked but answered immediately.											
	e. questions requiring student to analyze data.											
	f. statement requiring student to formulate conclusion.											
II.	g. directions to student to perform and analyze activity.											
	h. question to arouse student interest; not answered immediately											
	i. sentence directing student to figure; other types											
	j. rhetorical question											

Overall Involvement Index for Text

$$\text{Total} \frac{\text{II}}{\text{I}} =$$

Figure and diagram analysis

Number of page analyzed												Total
	a. illustration only											
	b. requires student to perform activity, use data											
	c. illustrates way of setting up apparatus for activity											
	d. fits none of above											

Overall Index for Figures

$$\text{Total} \frac{\text{b}}{\text{a}} =$$

Activities index:

Page Number											Total
a. number of activities proposed per page											

Overall Index for Activities

$$\text{Total} \frac{a}{n} =$$

(Where n= total number of pages examined)

Analysis of questions at chapter ends.

Question number											Total
a. answer in text											
b. definition											
c. requires student to apply learning to new situation.											
d. requires student to solve a problem.											
e. fits none of the above.											

Overall Index for question

$$\text{Total} \frac{c+d}{a+b} =$$

Analysis of chapter summaries

Chapter number											Total
a. repeats chapter conclusions											
b. raises new questions.											

Overall

Index for summaries $\text{Total}\frac{b}{a} =$

APPENDIX-II

CHECK-LIST

(For recording observations on those aspects which can be evaluated on Yes-No Scale)

Identification Data

1. Title _____
2. Author _____
3. Publisher _____
4. Year of Publication _____
5. Edition _____
6. Class for which prescribed _____
7. Number of Pages _____
8. Price _____

PHYSICAL ASPECTS

1.00 Design of the Textbook.

1.10 Appropriateness of Format

1.11	Is the text book size suitable?	Yes	No
1.12	Is the bulk of the book alright ?	Yes	No
1.13	Is the layout of the title page appropriate ?	Yes	No
1.14	Is the frotispiece relevant ?	Yes	No

1.20 Appropriateness of Typography

1.21 Is the type size suitable in terms of the content and the age-group of pupils ? Yes No

1.22 Is the type face suitable in terms of the content and the age-group of pupils? Yes No

1.23 Is the width of the margins appropriate ? Yes No

1.24 Is leading suitable ? Yes No

1.25 Does the single/double column text suit the age-group of pupils ? Yes No

1.26 Is the indenting of the paragraphs proper ? Yes No

2.00 Quality of Printing

2.10 Appropriateness of Paper

2.11 Is the grammage of the paper upto the mark ?Yes No

2.12 Is the colour of the paper suitable ? Yes No

2.13 Is the texture of the paper suitable ? Yes No

2.20 Appropriateness of Printing

2.21 Is the ink used suitable? Yes No

2.22 Is the impression of words sharp ? Yes No

2.23 Is the colour contrast of paper and ink appropriate ? Yes No

2.24 Is the printing free from show-through? Yes No

2.25 Is the alignment of lines proper ? Yes No

2.26 Is printing free from many mistakes ? Yes No

3.0 Get-up

3.10 Appropriateness of Title Cover

3.11 Is the title cover durable ? Yes No

3.12 Is the design of the cover attractive ? Yes No

3.13 Is the jacket suitable ? Yes No

3.20 Appropriate Binding

3.21 Is the material used for stitching suitable ? Yes No

3.22 Is the folding of papers proper ? Yes No

3.23 Does the book open flat with ease ? Yes No

3.24 Is the outer and inner pasting suitable ? Yes No

3.25 Are the sides of the book properly trimmed ? Yes No

4.0 Price

4.10 Bulk of the Text Book

4.11 Is the price worth the number of pages of the book ? Yes No

4.12 Is the price commensurate with the size of the paper used ? Yes No

4.20 Quality of Production

4.21 Is the price appropriate according to the quality of the paper used ? Yes No

4.22 Is the quality of the ink used conforms to the price ? Yes No

4.23 Is the price suitable in terms of the number of words per page ? Yes No

4.24 Is the price reasonable according to the number of coloured illustration ? Yes No

4.30 Users of the Textbook

4.31 Is the price all right in terms of the number of expected purchasers ? Yes No

4.32 Is the price in accordance with the purchasing capacity of the users ? Yes No

4.33 Is the price suitable considering the cost of distribution of text books ? Yes No